

Experiment 3: The resistance of a voltmeter

supply

In this experiment, you will be required to measure the resistance of a voltmeter and the electromotive force (e.m.f.) of a power supply.

- (a) Set up the circuit shown in Fig. 2.1. The resistor of resistance R can be made by using any combination of the resistors supplied. The resistance of each of the resistors is written on a card.

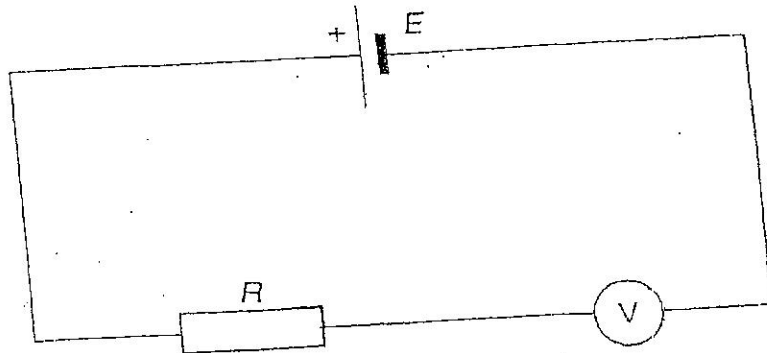


Fig. 2.1

- (b) Calculate the value of R for the combination of resistors used. Record this value. Measure and record the potential difference V indicated on the voltmeter.
- (c) Use a different combination of resistors to change the value of R . Repeat (b) until you have seven sets of readings for V and R . Include values of $1/V$ in your table of results.

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- (d) Justify the number of significant figures you have given for $1/V$.

- (e) It is known that V and R are related by the equation

$$\frac{1}{V} = \left(\frac{1}{ER_v} \right) R + \frac{1}{E},$$

where E is the e.m.f. of the power supply and R_v is the resistance of the voltmeter.

- (i) Plot a graph of $1/V$ (y-axis) against R (x-axis).
- (ii) Use your graph to determine values for E and R_v .